OVERVIEW

INTRODUCTION

Economists and policy makers have long considered research and development (R&D) to be a key component of economic growth. The contribution of R&D activities to local economies has been a topic of particular interest to state policy makers. This report, *Science and Engineering State Profiles: 1997,* provides statistics on the geographic distribution of R&D within the United States. R&D data for 52 areas—each of the 50 states, the District of Columbia and Puerto Rico—are derived from the several performer-based[1] surveys of the National Science Foundation's (NSF's) R&D Statistics Program. For each state (or geographic area) these data are categorized by major source of funds (industry, Federal Government, and academia), and by type of performer [industry, Federal Government, academia, Federally Funded Research and Development Centers (FFRDCs), and other nonprofit institutions] (table 1).[2] Data pertaining to Federally-funded R&D are presented in greater detail, in the form of a cross tabulation between: (1) specific Federal agencies from which such funds originate, and (2) the type of performer receiving those funds.

The most recent R&D data available on a state-by-state basis are for the year 1995.[3] In that year, total R&D expenditures in the United States were $183 billion, of which $177 billion could be attributed to expenditures within individual states, with the remainder falling under an undistributed, "other/unknown" category. The statistics and discussion below refer to state R&D levels in relation to the distributed total of $177 billion.

The "other/unknown" category includes R&D performed within the 50 states, or the District of Columbia, but where the specific location of such performance was not provided by survey respondents. It also includes R&D conducted by organizations within the United States, but where actual performance does not take place in a particular state or the District of Columbia, e.g., research conducted on marine vessels, and research in Puerto Rico.

For the compilation of these data, 15 sources were used, which include NSF statistical reports, as well as statistical reports from other Federal agencies, namely, the Department of Commerce (DOC), the Department of Labor (DOL), the Department of Education (DOE), and the U.S. Small Business Administration (SBA). A complete listing of these sources are provided at the end of this overview.

[1] In any discussion of R&D expenditures, an important distinction must be made between R&D "performance" (the situation in which R&D is actually carried out) and R&D funding "sources" (where the money for R&D originates). For example, a term like "Federal R&D" is ambiguous, in that it does not specify whether it is referring to performance or funding. The Federal Government is a much larger "source" of R&D funding (termed "Federal Funding of R&D") than a performer of R&D itself (termed "Federal Intramural R&D"). In the reporting of R&D by state, much more attention has been paid to R&D *performance* within states than R&D funding originating from states. Since R&D performance is an important component of the economic activity of the state, and the geographic location of funding organizations may have little bearing on economic activity within the same state, this report will focus on R&D performance.

[2] At present, data on R&D performed by nonprofit institutions within individual states include only R&D that derives from Federal funding. However, a survey of R&D by nonprofit organizations is now underway, which is expected to provide more complete data on R&D by nonprofit organizations in the near future.

[3] These complete data sets are only available in odd-numbered years. Thus, 1997 is the next year for such reporting and these data will be available by early 1999.

Table 1. R&D performance by state, sector, and sources of funds: 1995

Performing sector:			Industry			Universities and colleges						U&C FFRDCs	Other nonprofit institutions				Nonprofit FFRDCs
Funding sector:	Total R&D	Federal Govt.	Total	Federal Govt.[1]	Industry[1]	Total	Federal Govt.	Nonfed. Govt.	Industry	U&C	Nonprofits	Federal Govt.[2]	Total	Federal Govt.	Industry	Nonprofits	Federal Govt.
Location	(Thousands of current dollars)																
United States, total	183,013,221	17,342,745	132,103,000	23,451,000	108,652,000	22,101,220	13,331,158	1,654,996	1,492,433	4,023,631	1,599,002	5,405,345	5,152,493	2,806,493	830,000	1,516,000	831,393
Alabama	1,680,828	642,257	686,000	273,000	413,000	334,689	190,330	6,991	29,164	86,664	21,540	0	NA	17,882	NA	NA	0
Alaska	163,396	60,545	30,000	D	D	72,216	37,285	5,607	5,470	23,850	4	0	NA	635	NA	NA	0
Arizona	1,995,303	177,935	1,356,000	620,000	736,000	380,216	210,475	8,080	23,238	126,380	12,043	75,005	NA	6,198	NA	NA	0
Arkansas	329,500	57,563	181,000	D	D	87,799	33,348	23,779	7,693	19,717	3,262	0	NA	3,138	NA	NA	0
California	36,132,656	1,843,729	28,710,000	6,925,000	21,785,000	2,594,280	1,796,691	107,055	120,080	372,941	197,513	2,377,815	NA	361,960	NA	NA	245,360
Colorado	2,603,092	167,869	1,865,000	274,000	1,591,000	393,809	260,247	21,998	24,470	51,690	35,404	125,310	NA	46,418	NA	NA	4,743
Connecticut	4,310,652	17,690	3,906,000	389,000	3,517,000	377,225	227,915	18,732	20,327	78,243	32,008	0	NA	9,737	NA	NA	0
Delaware	1,148,632	15,477	1,077,000	12,000	1,065,000	53,161	27,352	2,144	3,681	14,560	5,424	0	NA	2,994	NA	NA	0
District of Columbia	3,128,056	2,106,077	672,000	17,000	656,000	181,461	132,770	814	13,297	19,937	14,643	0	NA	168,518	NA	NA	0
Florida	5,223,199	554,440	4,101,000	1,634,000	2,467,000	559,104	317,081	41,466	36,382	135,110	29,065	0	NA	8,165	NA	NA	0
Georgia	2,112,572	272,178	1,175,000	142,000	1,031,000	657,530	302,390	53,611	55,018	221,785	24,726	0	NA	7,766	NA	NA	0
Hawaii	508,912	401,963	14,000	D	D	78,429	44,238	26,789	299	3,738	3,365	0	NA	14,520	NA	NA	0
Idaho	913,961	27,792	827,000	D	D	58,621	19,710	13,615	7,408	16,350	1,538	0	NA	548	NA	NA	0
Illinois	7,486,667	80,626	5,776,000	146,000	5,630,000	817,640	467,952	46,903	43,048	195,052	64,685	770,554	NA	41,416	NA	NA	0
Indiana	3,162,633	62,061	2,721,000	382,000	2,339,000	375,719	197,095	22,463	34,542	101,283	20,336	0	NA	3,596	NA	NA	0
Iowa	1,391,030	37,257	998,000	D	D	322,769	163,620	47,279	19,391	77,793	14,686	31,925	NA	1,054	NA	NA	0
Kansas	763,777	12,296	569,000	D	D	181,496	70,026	39,353	11,434	52,517	8,166	0	NA	910	NA	NA	0
Kentucky	593,797	5,911	452,000	4,000	448,000	134,784	59,811	9,589	16,627	43,883	4,874	0	NA	1,102	NA	NA	0
Louisiana	423,102	45,108	61,000	D	D	314,996	135,838	71,898	21,317	66,446	19,497	0	NA	1,863	NA	NA	0
Maine	345,016	4,238	286,000	D	D	31,901	15,789	2,005	4,158	9,357	592	0	NA	23,310	NA	NA	0
Maryland	6,518,849	4,158,824	1,075,000	287,000	788,000	1,159,866	894,585	75,759	55,111	84,508	49,903	0	NA	123,499	NA	NA	1,564
Massachusetts	9,969,452	315,749	7,416,000	1,458,000	5,958,000	1,147,150	824,826	13,240	89,409	92,116	127,559	344,657	NA	587,363	NA	NA	158,589
Michigan	13,274,875	82,008	12,388,000	148,000	12,240,000	755,089	417,755	48,961	50,629	180,866	56,878	0	NA	49,778	NA	NA	0
Minnesota	3,086,938	30,139	2,636,000	315,000	2,321,000	336,524	194,819	49,543	23,427	46,235	22,500	0	NA	84,775	NA	NA	0
Mississippi	314,710	132,616	66,000	D	D	112,789	62,597	23,778	8,912	11,211	6,291	0	NA	3,305	NA	NA	0
Missouri	2,498,523	55,445	2,028,000	584,000	1,443,000	397,192	212,750	21,486	36,639	92,974	33,343	0	NA	17,723	NA	NA	0
Montana	119,109	33,553	17,000	D	D	66,879	27,382	12,914	5,825	20,172	586	0	NA	1,677	NA	NA	0
Nebraska	335,930	23,132	150,000	D	D	157,044	54,746	42,331	10,933	45,536	3,498	0	NA	5,754	NA	NA	0
Nevada	445,100	34,669	322,000	D	D	86,902	47,708	6,460	6,941	24,798	995	0	NA	1,457	NA	NA	0

See explanatory information and SOURCE at end of table.

Table 1. R&D performance by state, sector, and sources of funds: 1995

Performing sector:			Industry			Universities and colleges						U&C FFRDCs	Other nonprofit institutions				Nonprofit FFRDCs
Funding sector:	Total R&D	Federal Govt.	Total	Federal Govt.[1]	Industry[1]	Total	Federal Govt.	Nonfed. Govt.	Industry	U&C	Nonprofits	Federal Govt.[2]	Total	Federal Govt.	Industry	Nonprofits	Federal Govt.
Location	(Thousands of current dollars)																
New Hampshire	598,033	30,902	472,000	36,000	436,000	93,073	60,131	3,963	3,919	12,948	12,112	0	NA	1,722	NA	NA	0
New Jersey	9,127,706	343,667	8,200,000	197,000	8,002,000	443,371	208,934	39,535	25,861	135,607	33,434	125,685	NA	11,332	NA	NA	4,130
New Mexico	3,295,475	481,047	1,461,000	1,380,000	81,000	230,393	156,554	17,298	10,696	38,562	7,283	1,109,400	NA	6,218	NA	NA	7,417
New York	10,954,468	117,250	8,651,000	1,821,000	6,831,000	1,702,414	1,107,468	95,941	98,200	206,258	194,547	281,148	NA	202,749	NA	NA	0
North Carolina	3,191,499	220,179	2,226,000	15,000	2,212,000	686,609	431,682	97,647	74,086	61,857	21,337	0	NA	59,002	NA	NA	0
North Dakota	97,606	25,042	12,000	D	D	59,617	27,841	1,534	3,346	25,043	1,853	0	NA	947	NA	NA	0
Ohio	5,314,155	599,044	4,001,000	574,000	3,428,000	642,596	375,061	47,690	54,316	106,701	58,828	0	NA	71,914	NA	NA	0
Oklahoma	528,764	45,104	288,000	38,000	249,000	186,371	59,504	19,699	11,453	79,107	16,608	0	NA	9,289	NA	NA	0
Oregon	1,088,654	55,959	741,000	35,000	706,000	258,575	158,076	30,312	11,693	37,453	21,041	0	NA	33,120	NA	NA	0
Pennsylvania	6,919,124	227,520	5,331,000	376,000	4,955,000	1,139,531	754,444	34,954	120,303	164,296	65,534	31,525	NA	189,379	NA	NA	0
Rhode Island	896,458	254,302	520,000	D	D	105,501	72,461	3,225	2,479	25,644	1,692	0	NA	16,767	NA	NA	0
South Carolina	996,261	34,441	739,000	D	D	220,088	109,443	17,899	19,364	53,994	19,388	0	NA	2,732	NA	NA	0
South Dakota	54,667	13,428	19,000	0	19,000	21,392	10,623	6,772	469	2,341	1,187	0	NA	847	NA	NA	0
Tennessee	1,402,352	62,100	1,003,000	D	D	308,155	191,797	35,395	16,345	45,116	19,502	9,612	NA	19,875	NA	NA	0
Texas	8,385,028	537,508	6,211,000	912,000	5,298,000	1,472,165	747,687	158,886	102,486	296,606	166,500	0	NA	163,001	NA	NA	860
Utah	1,144,214	131,138	803,000	178,000	625,000	202,212	140,600	15,431	9,456	28,065	8,660	0	NA	7,730	NA	NA	0
Vermont	308,180	4,702	248,000	D	D	54,065	32,932	2,454	5,467	9,519	3,693	0	NA	1,413	NA	NA	0
Virginia	3,897,253	1,580,530	1,577,000	743,000	834,000	446,776	261,604	46,814	45,897	64,379	28,082	74,015	NA	41,651	NA	NA	177,472
Washington	5,240,679	159,837	4,294,000	D	D	485,970	340,327	13,761	39,429	77,212	15,241	0	NA	95,900	NA	NA	204,972
West Virginia	475,040	139,595	243,000	D	D	53,399	30,464	2,023	3,160	13,470	4,282	33,047	NA	5,999	NA	NA	0
Wisconsin	2,226,046	40,344	1,706,000	33,000	1,673,000	472,982	270,622	42,549	16,873	92,115	50,823	0	NA	6,720	NA	NA	0
Wyoming	86,767	8,669	25,000	D	D	40,470	15,373	3,125	1,930	17,454	2,588	0	NA	12,628	NA	NA	0
Other/unknown	5,804,960	771,290	1,772,000	3,502,000	8,875,000	548,215	320,399	53,446	30,335	114,172	29,863	15,647	2,594,497	248,497	830,000	1,516,000	26,286

[1]Federal support for "industry" R&D includes performance at industry FFRDCs, and industry support of industry R&D includes all non-Federal sources.

[2]Includes total R&D expenditures of FFRDCs administered by academic institutions.

KEY: FFRDCs = Federally Funded Research and Development Centers; U&C = universities and colleges; NA = Not Available; D = data have been withheld to avoid disclosing information about individual companies.

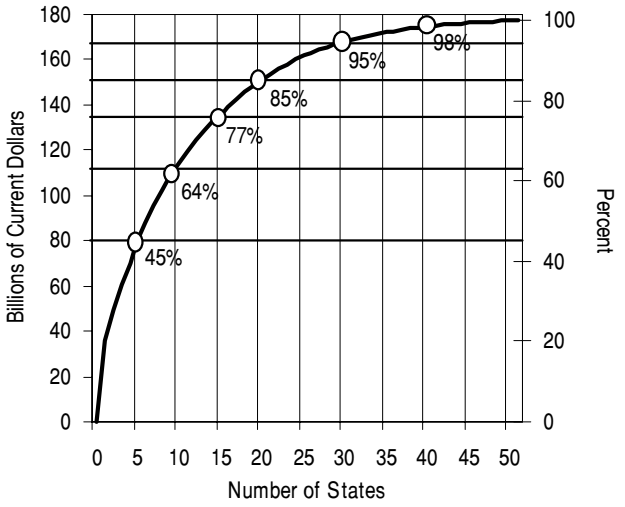
NOTES: Data are based on annual reports by performers except for the nonprofit sector. Detail may not sum to totals, due to rounding.

SOURCES: National Science Foundation/SRS. Data were derived from NSF/SRS, Research and Development in Industry 1995; NSF/SRS, Academic Science/Engineering: R&D Expenditures, Fiscal Year 1995; NSF/SRS, Federal Funds for Research and Development; Fiscal Years 1995, 1996, and 1997.

STATE DISTRIBUTION OF R&D PERFORMANCE

R&D is substantially concentrated in a small number of states. In 1995, California had the highest level of R&D expenditures—over $36 billion—representing approximately one-fifth of the $177 billion U.S. total. The six states with the highest levels of R&D expenditures—California, Michigan, New York, Massachusetts, New Jersey, and Texas (in descending order)—accounted for approximately one-half of the entire national effort. The top ten states—adding, in descending order, Illinois, Pennsylvania, Maryland, and Ohio—accounted for nearly two-thirds of the national effort (figure1 and table 2). California's R&D effort exceeded, by nearly a factor of three, the next-highest state, Michigan, with $13 billion in R&D expenditures. After Michigan, R&D levels declined relatively smoothly to approximately $5 billion for Ohio. The 20 highest-ranking states in R&D expenditures accounted for about 85 percent of the U.S. total; the lowest 20 states, for 5 percent.

Figure 1. Cumulative distribution of U.S. R&D performance, by state: 1995



Note: Includes R&D expenditures for the District of Columbia but excludes R&D that cannot be distributed by state.

Source: National Science Foundation/SRS, *National Patterns of R&D Resources,* annual series.

States that are highest in total R&D performance are usually ranked among the highest in industrial and academic R&D performance. For example, among the top 10 for total R&D, eight states were among the top 10 for industrial R&D, and eight were among the top 10 for academic R&D, as shown in table 2.

For Federal intramural research, there was less commonality with the top ten for total R&D. Only four states were found in both top-ten lists: Maryland, California, Ohio, and Texas. The six others in the Federal intramural list, in descending order of Federal R&D performance, were the District of Columbia,

Table 2. Leading states in total R&D performance, R&D by sector, and R&D as a percentage of gross state product (GSP): 1995

	Top 10 states in total R&D performance		Top 10 states in size of R&D, by type of performer			Top 10 states in R&D intensity (states having the highest R&D/GSP ratio)		
Rank	Total R&D (millions of dollars)	Top 10 states[1]	Industry[2]	Universities and colleges[3]	Federal Government	Top 10 states	R&D/GSP (percent)	GSP (preliminary, in billions of dollars)
1	$36,133	California	California	California	Maryland	New Mexico	8.1%	$40.5
2	13,275	Michigan	Michigan	New York	District of Columbia	District of Columbia	6.4	48.7
3	10,954	New York	New York	Illinois	California	Michigan	5.2	255.0
4	9,969	Massachusetts	New Jersey	Massachusetts	Virginia	Massachusetts	5.1	197.2
5	9,128	New Jersey	Massachusetts	Texas	Alabama	Maryland	4.7	138.0
6	8,385	Texas	Texas	New Mexico	Ohio	Delaware	4.0	28.5
7	7,487	Illinois	Illinois	Pennsylvania	Florida	California	3.9	914.8
8	6,919	Pennsylvania	Pennsylvania	Maryland	Texas	Connecticut	3.7	115.6
9	6,519	Maryland	Washington	Michigan	New Mexico	Rhode Island	3.6	24.9
10	5,314	Ohio	Florida	North Carolina	Hawaii	Idaho	3.5	25.8

[1]Includes in-state R&D performance of industry, universities, associated Federally Funded Research and Development Centers (FFRDCs), and Federal agencies and FFRDCs administered by nonprofit institutions. For the tabulations, states include the District of Columbia.

[2]Includes R&D activities of industry-administered FFRDCs located within these states.

[3]Includes R&D activities of university-administered FFRDCs located within these states.

SOURCE: National Science Foundation/SRS, *National Patterns of R&D Resources,* annual series.

Virginia, Alabama, Florida, New Mexico, and Hawaii. Maryland ranked first among Federal R&D performers, followed by the District of Columbia, California, and Virginia. The placement of Maryland, the District of Columbia, and Virginia among the top four in Federal R&D performance reflects the concentration of Federal facilities and administrative offices within the national-capital area.[4] Alabama, Florida, and New Mexico rank among the highest in Federal R&D because of their relatively high shares of Federal space- and defense-related R&D. Hawaii ranks among the highest in Federal R&D because of its relatively high level of intramural research conducted by the Department of Health and Human Services.

Ratio of R&D to Gross State Product

States vary widely in the size of their economies, owing to differences in population, land area, infrastructure, natural resources, and history. Consequently, variation in the R&D expenditure levels of states may simply reflect differences in economic size or the nature of their R&D efforts. A simple way of controlling for the size effect is to measure each state's R&D level as a proportion of its gross state product (GSP) (table 3). That proportion is referred to as R&D "intensity" or "concentration." Overall, the Nation's total

Table 3. Comparison of R&D expenditures and preliminary gross state products (GSP): 1995

State	R&D performance	Preliminary gross state product (GSP)	R&D as a percent of GSP	State	R&D performance	Preliminary gross state product (GSP)	R&D as a percent of GSP
	(millions of dollars)				(millions of dollars)		
Alabama	$1,681	$92,849	1.81%	Nebraska	$336	$43,295	0.78%
Alaska	163	22,999	0.71	Nevada	445	48,212	0.92
Arizona	1,995	103,015	1.94	New Hampshire	598	31,444	1.90
Arkansas	330	53,573	0.62	New Jersey	9,128	265,686	3.44
California	36,133	914,762	3.95	New Mexico	3,295	40,478	8.14
Colorado	2,603	107,202	2.43	New York	10,954	596,452	1.84
Connecticut	4,311	115,634	3.73	North Carolina	3,191	192,634	1.66
Delaware	1,149	28,462	4.04	North Dakota	98	13,400	0.73
District of Columbia	3,128	48,679	6.43	Ohio	5,314	288,364	1.84
Florida	5,223	338,142	1.54	Oklahoma	529	67,993	0.78
Georgia	2,113	196,496	1.08	Oregon	1,089	79,902	1.36
Hawaii	509	36,843	1.38	Pennsylvania	6,919	306,374	2.26
Idaho	914	25,791	3.54	Rhode Island	896	24,949	3.59
Illinois	7,487	348,763	2.15	South Carolina	996	84,083	1.18
Indiana	3,163	144,703	2.19	South Dakota	55	17,282	0.32
Iowa	1,391	70,398	1.98	Tennessee	1,402	134,123	1.05
Kansas	764	64,219	1.19	Texas	8,385	510,289	1.64
Kentucky	594	90,301	0.66	Utah	1,144	45,233	2.53
Louisiana	423	106,525	0.40	Vermont	308	13,886	2.22
Maine	345	26,944	1.28	Virginia	3,897	186,330	2.09
Maryland	6,519	137,996	4.72	Washington	5,241	151,777	3.45
Massachusetts	9,969	197,190	5.06	West Virginia	475	35,776	1.33
Michigan	13,275	254,994	5.21	Wisconsin	2,226	131,517	1.69
Minnesota	3,087	131,406	2.35	Wyoming	87	16,110	0.54
Mississippi	315	53,017	0.59				
Missouri	2,499	135,174	1.85	TOTAL	177,208	7,155,826	2.48
Montana	119	17,731	0.67				

NOTE: Detail does not add to total because of rounding.

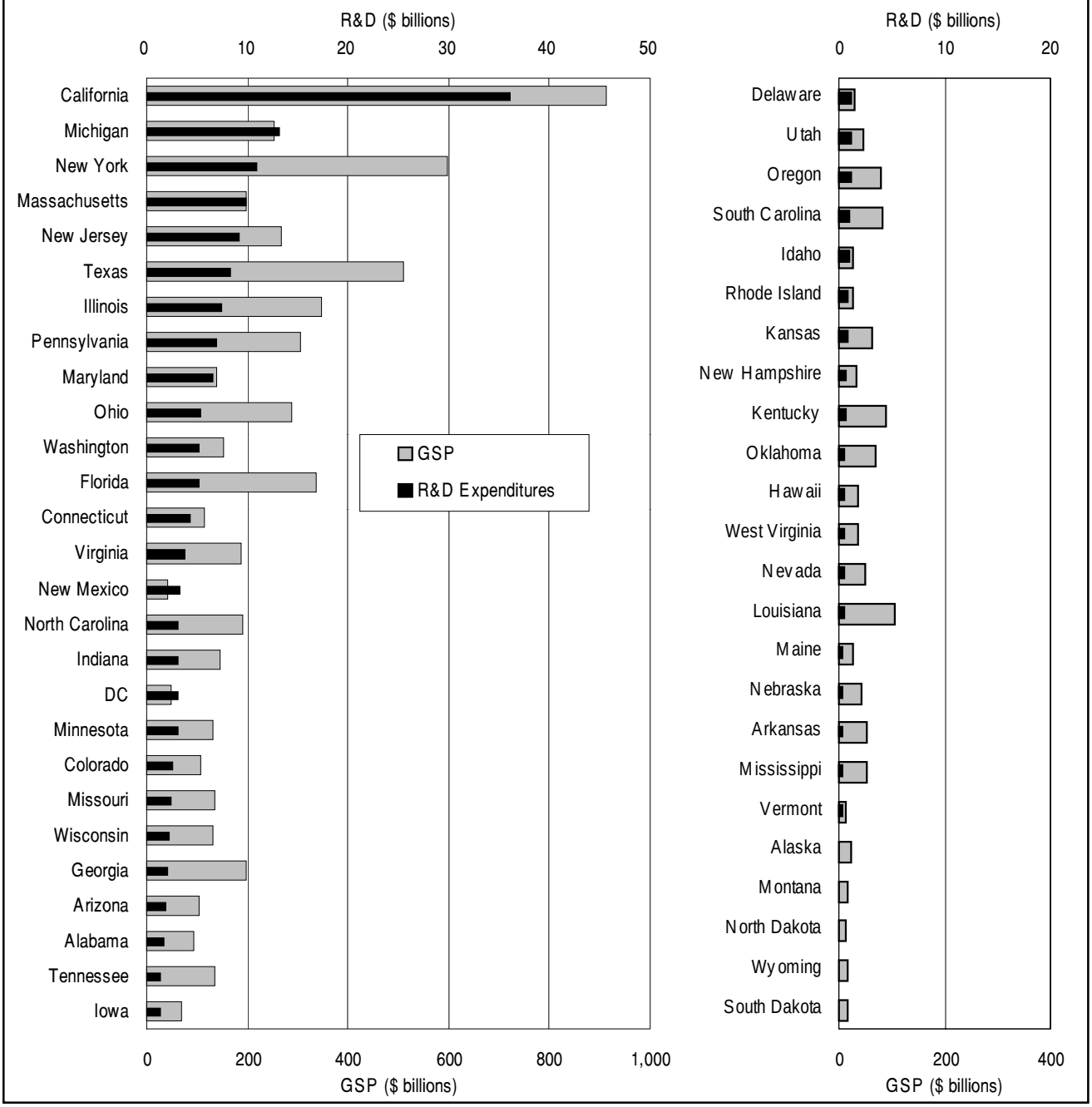
SOURCE: National Science Foundation/SRS. Preliminary GSP tabulations were based on the earnings component of GSP provided by the Bureau of Economic Analysis, Department of Commerce.

[4] Federal intramural performance includes the administration of extramural R&D programs.

R&D to gross domestic product ratio was 2.5 percent in 1995. The top 10 rankings for R&D intensity were, in descending order, New Mexico (8.1 percent), the District of Columbia, Michigan, Massachusetts, Maryland, Delaware, California, Connecticut, Rhode Island, and Idaho (the latter with an intensity of 3.5 percent). New Mexico's R&D intensity is largely attributable to Federal support to the Sandia National Laboratories and Los Alamos National Laboratory FFRDCs in the state, provided by the Department of Energy.

Figure 2 juxtaposes state R&D performance with GSP, with the 50 states and the District of Columbia ranked in descending order of R&D. R&D expenditures are displayed as a dark bar, measured on the upper axis; GSP is displayed as a wider gray bar

Figure 2. Relationship between the amount of R&D performed in a state and the size of its economy (GSP): 1995



NOTE: Includes R&D expenditures for the District of Columbia but excludes R&D that cannot be distributed by state. States are ranked by total R&D expenditures.

SOURCE: National Science Foundation/SRS, *National Patterns of R&D Resources,* annual series.

measured on the lower axis; both are measured in billions of dollars. The two highest-ranked states in total R&D—California and Michigan—clearly show R&D levels that are relatively high in relation to their GSPs, as reflected by their presence in the top 10 list for R&D intensity (table 2).

Some states with below-average R&D intensity ranked high in total R&D performance because of their large economies. The state ranked third in R&D performance, New York, had a relatively low (1.8 percent) R&D intensity. Thus, its third-place position in total R&D performance may be a function of its large state economy. The same may be said of Texas, Illinois, Pennsylvania, Ohio, and Florida. In contrast, Massachusetts, New Jersey, and Maryland are more like California and Michigan, with relatively high R&D levels in relation to economic size. As can also be seen in figure 2, states with relatively low levels of total R&D tend, on average, to have low R&D intensity, with the exceptions of Delaware, Idaho, and Rhode Island. South Dakota, with the lowest total R&D level, also had the lowest R&D intensity (0.3 percent).

Federal Support for R&D

In addition to the performer-reported data described above, data on Federal support for R&D are available from surveys of the Federal agencies that provide such funds. Levels of Federal funding according to the surveyed performers can differ from levels according to the surveyed funding agencies. (See the technical note below on these differences.)

As reported by Federal agencies that fund R&D, the Department of Defense (DoD) and the Department of Health and Human Services (HHS) together provided 68 percent of the $67 billion in total Federal support for R&D to all types of performers in fiscal year (FY) 1995. California and Maryland were the two leading recipients of Federal R&D funds (table 4). Performers in California, primarily industrial firms, received 21 percent of DoD's R&D support. Maryland received 20 percent of HHS' funding, largely supporting intramural activities undertaken at biomedical research facilities at the National Institutes of Health (NIH). California received more R&D funds from both the National Aeronautics and Space Administration (NASA) and NSF than any other state. The main recipients in California of NASA R&D funding were industrial firms and FFRDCs, while the main recipients of NSF funding were universities and colleges. Maryland had the largest share of any one Federal agency's total R&D support, with one-third of the DOC R&D funds. Intramural research activities accounted for most of this funding, associated primarily with DOC's National Institute of Standards and Technology (NIST).

Technical Note:

Differences in performer-reported and source-reported Federal R&D

The NSF collects, and these profiles contain, two separate estimates on total Federal funding of R&D. Survey data are obtained from both Federal funding agencies and performers of the work (Federal labs, industry, universities, and other nonprofit organizations). National totals, however, are based on data reported by performers because they are in the best

Table 4. Federal R&D obligations, by agency and state: FY 1995

Agency	Total R&D (millions of dollars)	Largest recipient	Percent of total received	Second-largest recipient	Percent of total received
Total for the ten agencies listed	$67,080	California	18.9%	Maryland	10.5%
Department of Agriculture	1,368	District of Columbia	10.4	Maryland	9.9
Department of Commerce	1,134	Maryland	32.6	California	7.6
Department of Defense	34,207	California	21.3	Georgia	11.4
Department of Energy	6,118	New Mexico	17.4	California	17.3
Department of Health and Human Resources	11,411	Maryland	19.6	California	11.4
Department of the Interior	460	Virginia	11.1	Colorado	9.9
Department of Transportation	727	District of Columbia	24.4	New Jersey	11.2
Environmental Protection Agency	548	North Carolina	21.2	District of Columbia	11.0
National Aeronautics and Space Administration	8,964	California	27.9	Texas	21.8
National Science Foundation	2,144	California	13.8	New York	9.3

SOURCE: National Science Foundation/SRS, *Federal Funds for Research and Development: Fiscal Years 1995, 1996, and 1997*.

position to (i) indicate how much they spent in the actual conduct of R&D in a given year and to (ii) identify the sources of their funds. Performer reporting also reduces the possibility of double-counting and conforms to international standards and guidance.

Historically, the two survey systems of sources and performers tracked fairly closely. For example, in 1980 performers reported using $29.9 billion in Federal R&D funding and Federal agencies reported total R&D obligations of $29.8 billion. In recent years, the two series have diverged considerably: For 1995, performers report $63.1 billion in Federal R&D support, compared with the $68.8 billion reported by Federal agencies (table 5). (Note that the $67.1 billion in Table 4 and in the U.S. total in the state profiles differs from the $68.8 billion amount because state data are collected from just 10 Federal agencies). The difference in the Federal R&D data totals appears to be concentrated in funding of industry. Overall, in each year since 1989, industrial firms have reported less in Federal R&D support than the amounts that Federal agencies have reported in supporting industrial R&D. The difference has been as large as $9.3 billion, observed in 1994. For 1995, Federal agencies reported $31.7 billion in total R&D obligations provided to industrial performers compared with $23.5 billion in Federal R&D funding reported by industrial performers (table 6). Consequently, data users are cautioned to exercise considerable care in comparing the R&D performance data in table 2 (and detailed in the upper half of the state profiles) with that reported by Federal agencies in table 4 (and detailed in the lower half of the profiles). NSF is investigating the causes of these divergent trends.

Table 5. Difference in agency-reported and performer-reported Federal R&D, all performers: 1978–97

Year	Reported by Federal Agencies (fiscal-year basis)			Performer-reported expenditures (calendar year basis)
	Authorizations	Obligations	Outlays	
	(Millions of current dollars)			
1978.....	$25,976	$25,845	$24,020	$24,279
1979.....	28,208	28,145	25,838	27,100
1980.....	29,739	29,830	29,154	29,857
1981.....	33,735	33,104	32,459	33,666
1982.....	36,115	36,433	34,391	37,113
1983.....	38,768	38,712	36,659	41,362
1984.....	44,214	42,225	39,691	46,319
1985.....	49,887	48,360	44,171	52,493
1986.....	53,249	51,412	50,609	54,475
1987.....	57,069	55,254	51,612	58,254
1988.....	59,106	56,769	54,739	59,930
1989.....	62,115	61,407	59,450	60,301
1990.....	63,781	63,560	62,135	61,456
1991.....	65,898	61,295	61,130	60,563
1992.....	68,398	65,593	62,935	60,693
1993.....	69,884	67,314	65,241	60,350
1994.....	68,331	67,256	66,159	60,692
1995.....	68,791	68,755	66,375	63,147
1996 preliminary...	69,069	69,077	66,877	62,810
1997 preliminary...	69,916	68,064	67,692	62,745

SOURCES: National Science Foundation/SRS, Survey of Federal Funds for Research and Development 1995–97; NSF/SRS, *Federal R&D Funding by Budget Function, FYs 1995–97*; and NSF/SRS, *National Patterns of R&D Resources,* data series.

Science and Engineering Profiles

In addition to the state R&D statistics summarized above, the state profiles contain other statistics (from both NSF and non-NSF sources) relating to economic activity within the state. These data are included in a set of 52 one-page S&E profiles available in hard copy or from the World Wide Web. NSF survey indicators include numbers of doctoral scientists and engineers, doctorate degrees awarded by major S&E field,[5] S&E graduate students and postdoctorates, amounts of Federal R&D obligations by agency and performer, total and industrial R&D expenditures, and academic R&D expenditures by major S&E field. Indicators from non-NSF sources include population, civilian labor force, per capita personal income, total Federal expenditures (not just on R&D), higher education expenditures, patents, small business innovation research (SBIR) awards, and GSP by originating economic sectors. In these profiles, state rankings and totals are provided for the 50 states, the District of

[5]"Environmental Sciences" for S&E doctorate data are the sum of earth, atmospheric, and ocean sciences. "Life Sciences" for S&E doctorate data were defined as including both biological and agricultural sciences. Medical or health-related data are collected but non-S&E health fields are excluded.

Table 6. Difference in agency-reported and performer-reported Federal R&D: industrial performers by agency source, 1980–95

Year	Industry survey			Federal survey			Difference in report totals		
	Total	Department of Defense	Other agencies	Total	Department of Defense	Other agencies	Total	Department of Defense	Other agencies
	(millions of current dollars)								
1980	$14,029	NS	NS	$14,377	$9,114	$5,263	-$348		
1981	16,382	$10,540	$5,842	16,282	10,931	5,351	100	-$391	$491
1982	18,545	NS	NS	18,699	13,943	4,756	-153		
1983	20,680	14,571	6,109	18,522	14,670	3,852	2,158	-99	2,257
1984	23,396	NS	NS	20,219	16,077	4,142	3,178		
1985	27,196	20,948	6,248	23,496	19,069	4,427	3,700	1,879	1,821
1986	27,891	NS	NS	25,898	21,648	4,250	1,993		
1987	30,752	22,252	8,505	28,629	24,258	4,371	2,128	-2,006	4,134
1988	30,343	NS	NS	28,631	23,610	5,020	1,713		
1989	28,554	NA	NA	30,603	25,043	5,560	-2,049	NA	NA
1990	28,125	NS	NS	31,697	24,862	6,835	-3,571		
1991	26,372	NA	NA	28,589	21,349	7,240	-2,217	NA	NA
1992	24,722	NS	NS	31,862	24,443	7,419	-7,140		
1993	22,809	15,044	7,765	31,777	23,856	7,921	-8,968	-8,812	-156
1994	22,463	NS	NS	31,748	23,524	8,224	-9,285		
1995	23,451	13,876	9,575	31,673	22,645	9,027	-8,222	-8,769	548

KEY: NS = not surveyed in this year
NA = not available

NOTES: Data from the Industry survey are R&D expenditures as reported by performing firms and industry-administered, Federally Funded Research and Development Centers (FFRDCs). Data from the Federal survey are R&D obligations to industry as reported by Federal agencies. The last three columns report the difference between the two data series.

SOURCES: National Science Foundation/SRS, Survey of Federal Funds for Research and Development, Survey of Industrial Research and Development, and *National Patterns of R&D Resources,* data series.

Columbia, and Puerto Rico. Because data on total and industrial R&D expenditures are not available for Puerto Rico, rankings for those two variables exclude Puerto Rico.

Of the 17 main indicators ranked by state in the profiles (excluding the rankings in the bottom half of each profile involving Federal R&D obligations by state and performer), California ranked first in each except in personal income per capita, where it ranked 13th. New York ranked 2nd in eight of the indicators and ranked no lower than 8th in any of the others. Texas ranked between 2nd and 7th in all indicators, except in personal income per capita, where it ranked 32nd.

In this report, when states are ranked by a particular statistic, two or more states may have the same value for that statistic. When such ties occur, the tied states are given the same rank, and the next lowest state is given a rank equal to the number of higher ranked states plus 1. For example, if two states are tied for 27th place, they both receive a rank of "27," no state is given a rank of "28," and the next lowest state is given a rank of "29."

For many survey statistics used in this report, some fraction of the survey totals could not be allocated to specific geographic regions, or were for U.S. areas other than the 52 listed in this report (e.g., territories). Consequently, U.S. totals reported here may differ from those reported in the underlying surveys.[6] Also, because of rounding, the sum of the gross state product sector percentages may not equal 100 percent.

[6] For three variables—personal income per capita, number of SBIR awards, and gross state product,—the data sources for Puerto Rico differ from those used to obtain state data.

For some states, reported levels of R&D expenditures and levels of doctoral scientists and engineers are relatively small. For these cases, sampling error in the surveys associated with these statistics may have bearing on the precision of these data, including state rankings. Particular caution in this regard should be used in comparisons among states with low levels of doctoral scientists and doctoral engineers. For example, South Dakota is ranked lowest in doctoral engineers with an estimated number of 77 in the state, and Wyoming is the next highest in rank with 117. However, according to the survey of doctorate recipients from which these data were obtained, any estimate of 100 doctoral engineers is subject to a standard error of 40, implying that the difference between these two states for this variable is not statistically significant.[7] For 1,000 doctoral engineers, there is a standard error of 120. For doctoral scientists, the standard error for 100 scientists is also 40, and for 1,000 scientists it is 110. Readers should consult with the original sources of these data, as listed below, for additional information on standard errors associated with these and other statistics reported.

For information about, and copies of, *Science and Engineering State Profiles*, please contact:

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[7] See "Methodological Report of the 1995 Survey of Doctorate Recipients," National Research Council, Washington, DC.